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| 10/531,690 | 04/15/2005 | Piotr Kula | 122083 | 1493 |
| 25944 7590 07/09/2008 OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850 | | | | |
| EXAMINER | | | | |
| ZHU, WEIPING | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 1793 | | | | |
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| 07/09/2008 | | PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,690

Applicant(s)

KULA ET AL.

Examiner

WEIPING ZHU

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 6-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 6-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CIS)
- Paper No(s) Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s) Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 19, 2008 has been entered.

Status of Claims

2. Claims 1-2 and 6-8 are currently under examination wherein claims 1 and 2 have been amended and claims 6-8 have been newly added in applicant's amendment filed on May 19, 2008. Claims 3-5 have been cancelled by the applicant in the same amendment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP ('765) in view of Meyer et al. ('397).

With respect to claims 1, 2 and 6-8, JP ('765) discloses a gas mixture for vacuum carburizing (i.e. the claimed under-pressure carburizing) comprising 70% ethylene gas

and 30% acetylene gas (paragraph [0024], translation). The content ratio of acetylene to ethylene is 0.428, which is beneficial and preferable (paragraphs [0025] and [0026]). JP ('765) does not specify the content ratio of acetylene to ethylene as claimed in the instant claims 1 and 2. However, it is well held that discovering an optimum value of a result-effective variable involves only routine skill in the art. In re Boesch, 617, F.2d 272, 205 USPQ 215 (CCPA 1980). In the instant case, the content ratio of acetylene to ethylene is a result-effective variable, because it would directly affect the resultant surface carbon concentration, the carbon concentration gradient, microstructures, soot generation of the carburized article and the cost of the carburizing process as disclosed by JP ('765) (paragraphs [0025] and [0026]). See MPEP 2144.05 II. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the content ratio of acetylene to ethylene as disclosed by JP ('765) in order to achieve desired surface properties and structures of the carburized article at a reduced cost.

It would have been obvious to one of ordinary skill in the art at the time the invention was made that the gas mixture of JP ('765) is capable of being further mixed with other elements modifying the carburizing process as desired. JP ('765) does not teach the gas mixture contains other components as claimed in the instant claims 1 and 6-8. Meyer et al. ('397) discloses a method for carburizing and carbonitriding metal surfaces comprising mixing the carbon carrier with nitrogen and hydrogen or ammonia (col. 1, line 51 to col. 2, line 24). Meyer et al. ('397) does not specify the proportions of the hydrogen and the ammonia with respect to the carbon carrier as claimed in the instant claim 1. However, it is well held that discovering an optimum value of a result-

effective variable involves only routine skill in the art. In re Boesch, 617, F.2d 272, 205 USPQ 215 (CCPA 1980). In the instant case, the proportions of the hydrogen and the ammonia with respect to the carbon carrier are result-effective variables, because they would directly affect the preferential creation of carbide, nitride and/or carbonitride surface layers as disclosed by Meyer et al. ('397) (col. 5, lines 41-51). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have mixed hydrogen and ammonia with the carbon carrier of JP ('765) as disclosed by Meyer et al. ('397) in order to deposit carbide and carbonitride at the surface of the steel as disclosed by Meyer et al. ('397) (col. 1, lines 53-55 and col. 2, lines 17-24) and then to have optimized the proportions of the hydrogen and the ammonia with respect to the carbon carrier in the gas mixture of JP ('765) as disclosed by Meyer et al. ('397) in order to achieve the desired surface layers. See MPEP 2144.05 II.

Response to Arguments

4. The applicant's arguments and the Declaration under 37 C.F.R. §1.132 signed by one of the inventors Mr. Piotr Kula filed on May 19, 2007 have been fully considered but they are not persuasive.

The applicant argues that the claimed content ratio of acetylene to ethylene in the range of 0.55 to 2.0 is critical and can generate unexpected results in hydrocarbon decomposition and the amount of soot and tar-by-product remaining on the sample surfaces as evidenced by the experiments described in the Declaration. In response, the examiner notes that the rejection was based on the prior art's broad disclosure

rather than preferred embodiments. See MPEP 2123 and ground(s) of rejection of the ratio in the paragraph 3 above. The examiner further notes that the applicant failed to establish the criticality of the content ratio of acetylene to ethylene between the ratio of 0.428 of JP ('765) and the claimed lowest ratio of 0.55 in the experiment, because 1) the amount of hydrogen in the exhaust gases is a qualitative factor to determine the efficiency of a carbon transfer from a hydrocarbon to a solid state as indicated in the Declaration (paragraph bridging pages 4 and 5), it would not be appropriate to make a quantitative comparison of the amounts of hydrogen in the exhaust gases from the experiments to draw a conclusion based on qualitative data; 2) the flow rates of ethylene in the Experiments 1 and 2 are different introducing another variable in the experiments in addition to the A/E ratio; 3) the EDS analyses as shown in Fig. 4 (a) and 4(b) would not evidence the difference in the amount of soot and tar-by-product remaining on the sample surfaces of the Experiments 1 and 2 as asserted by the applicant, because the EDS analyses were performed on random, small areas on the sample surfaces; and 4) the lower hydrocarbon decomposition for the Experiment 2 in the initial 12 minutes of the boost stage could obviously be resolved by a longer time of boost, which is not limited by the instant claims. Therefore, one of ordinary skill in the art would expect the same results in the hydrocarbon decomposition and the amount of soot and tar-by-product remaining on the sample surfaces between the claimed and JP ('765) in view of Meyer et al. ('397)'s carburizing processes.

Conclusion

5. This Office action is made non-final. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Weiping Zhu whose telephone number is 571-272-6725. The examiner can normally be reached on 8:30-16:30 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

WZ

6/22/2008

Application Number**Application/Control No.**

10/531,690

Examiner

WEIPING ZHU

**Applicant(s)/Patent under
Reexamination**

KULA ET AL.

Art Unit

1793